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TRANSMITTAL FORM

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First Named Inventor	Paul E. Johnson
Art Unit	2872
Examiner Name	A. Lavarias
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- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
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  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
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- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
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- [x] Other Enclosure(s) (please Identify below):

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Remarks

Appeal Brief revised per Notification of Non-Compliance Mailed January 16, 2004. (In Triplicate)

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Jennifer L. Bales
Signature	Jenny Bales
Date	January 28, 2004

CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Michelle Mintling		
Signature	Michelle Mintling	Date	January 28, 2004

In the United States Patent and Trademark Office
Before the Board of Patent Appeals and Interferenc s

Applicant:	Paul E. Johnson	)	On Appeal to the
Serial No.:	09/804,522	)	Board of Appeals
Filed:	March 12, 2001	)	Appeal No. Not yet assigned
For:	LED Illuminated Particle Detection Apparatus and Methods	)	Examiner: A. Lavarias
		)	Group: 2872
		)	Date: January 27, 2004

Brief on Appeal

Honorable Commissioner of Patents

Washington, D.C. 20231

Sir:

This is an appeal from the Final Rejection, dated August 7, 2003 for the above identified patent application. This Brief supports the Notice of Appeal filed on August 25, 2003.

(1) Real Party in Interest

The real party of interest in the above-identified patent application is the University of Wyoming.

(2) Related Appeals and Interferences

There are no related appeals or interferences.

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The claims on appeal are originally-filed claims 1-20, as shown in Appendix A. Claims 1, 2, 6-8, and 13 stand finally rejected under 35 U.S.C. § 102(e). Claims 3-5, 9-12, and 14-20 stand finally rejected under 35 U.S.C. § 103(a).

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One Amendment to the specification was filed December 24, 2002 and was entered by the Examiner. The claims have not been amended.

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Flow Cytometry requires an illumination source to illuminate particles in the flow, so that the illuminated particles absorb, fluoresce or scatter light sufficiently to be detected by a photodetector. See page 2, lines 2-20 of the present patent application. In the past, the illumination source has comprised a gas laser or laser diode, but never an LED, because flow cytometry requires concentrated light in a small imaging area.

It has now been discovered that an LED (202a, 202b in Figure 2) may be used as the illumination source in a flow cytometer, so long as nearly all of the light from the LED is collected and concentrated at a selected volume in the sample flow stream (303 in Figure 3). It is necessary to use a highly converging element, such as a ball lens (204), placed very close to the LED light source (close enough to require removal of the LED lens, if any, see element 202a), to collect nearly all the light, because LEDs are highly diffuse light sources. A second lens (206) then focusses the light to a tight beam within the flow sample. See Page 4, lines 1-5 and Page 5, lines 8-16.

(6) Issues

(1) Are claims 1, 2, 6, 7, 8, and 13 anticipated under 35 U.S.C. §102(e) by Maekawa et al. 5,644,388?

(2) Are claims 3-5, 9-12, and 14-20 unpatentable under 35 USC §103(a) over Maekawa et al. in view of Martin et al., U.S. Pat. No. 4,573,796 or Ross et al., U.S. Pat. No. 5,877,863?

(7) Grouping of Claims

Group 1: Claims 1, 2, 6-8, and 13 stand finally rejected under 35 U.S.C. § 102(e). Claims 3-5, 9-12, and 14-20 stand finally rejected under 35 U.S.C. § 103(a). All of the claims stand or fall together.

(8) Argument

Group 1 Argument:

Claim 1 is reproduced below for discussion. The arguments presented with respect to claim 1 are applicable to the other claims in Group 1.

> Claim 1. An LED illumination source device for use in a flow particle detection device comprising:
>
> an LED for providing light at a selected wavelength; and
>
> **an optical element for collecting nearly all of the light from the LED** and concentrating the collected light at a selected volume within a flow sample stream.

Rejection of claims under 35 U.S.C. § 102 requires that a single prior art reference disclose each and every element of the claim, either expressly or inherently. Verdegall Brs., Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 USPQ2nd 1051, 1053 (Fed. Cir.), cert. Denied, 484 U.S. 827 (1987). Anticipation requires a showing that each limitation of a claim is found in a single reference, In re Donohue , 766 F.2d 531, 534, 226 USPQ 619, 621 (Fed Cir. 1985), cited in Bristol-Myers Squibb v. Ben Venue Laboratories, 246 F.3d 1368 (Fed. Cir. 2001).

Crown Operations Int'l., Ltd. v.Solutia Inc., 289 F.3d 1367 (Fed. Cir. 2002) discussed what is required for an element of a claim to be inherent:

> Regarding alleged anticipation by the Gillery patent, on its face the Gillery patent does not disclose or discuss a two percent limitation for the reflectance contribution of the solar control film. Crown maintains that the '511 patent merely claims a preexisting property inherent in the structure disclosed in the prior art. Crown urges us to accept the proposition that if a prior art reference discloses the same structure as claimed by a patent, the resulting property, in this case, two percent solar control film reflectance, should be assumed. We decline to adopt this approach because this proposition is not in accordance with our cases on inherency. <u>If the two percent reflectance limitation is inherently disclosed by the Gillery patent, it must be necessarily present and a person of ordinary skill in the art would recognize its presence.</u> In re Robertson , 169 F.3d 743, 745, 49 USPQ2d 1949, 1950?51 (Fed. Cir. 1999); Continental Can , 948 F.2d at 1268, 20 USPQ2d at 1749. <u>Inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient."</u> Id. at 1269, 20 USPQ2d at 1749

(quoting In re Oelrich , 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981)). (Emphasis added)

(quoted from online repository at Georgetown University, URL http://www.ll.georgetown.edu/federal/judicial/fed/opinions/01opinions/01-1144.html)

The single reference cited (U.S. Pat No. 5,644,388 to Maekawa et al) by the Examiner does not show, teach or suggest every element of the rejected claims, directly or inherently. Specifically if does not show "an optical element for collecting nearly all of the light from the LED. . ." as is specified in each independent claim.

Appendix B (found in the record in Office Communication of August 27, 2003) shows why this is so. LEDs are highly divergent and uncollimated. In order to collect a majority of the light from an LED, it is necessary to use use highly converging optics very close to the LED light source. The embodiment shown in Figures 2 and 3 of the present application uses a highly converging ball lens (204), placed very close to the LED light source (close enough to require removal of the LED lens, if any, see element 202a), and a second lens (206) that focusses the light to a tight beam within the flow sample. See Page 4, lines 1-5 and Page 5, lines 8-16.

The Examiner argues, in the Office Action of August 7, 2003 (paragraph 2 in Response to Arguments), that "any amount of incident light collected by an optical element may be construed as collecting nearly all of the incident light by the optical element." However, the claims do not specify "an optical element for collecting nearly all of the light **incident upon said optical element**" but rather "an optical element for collecting nearly all of the light **from the LED**." It is true that a conventional lens, spaced apart from a diverging light source, will collect nearly all of the light incident upon it. It will not, however, collect nearly all of the light from the light source unless the light from the light source is collimated.

Maekawa et al uses an LED (ref. no. 16) as a triggering device for the actual illumination source, a pulse laser (ref. no. 3). This embodiment is found in Figure 5 of Maekawa et al. Figure 9 uses a CW triggering device (ref. no. 29) which might be an LED, though this is not stated. LED 16 in Figure 5 does not include any focussing optics at all. CW source 29 includes a conventional lens 30, spaced apart from the CW source 29. If CW source is an LED, it apparently does not have its front transparent dome removed. Neither the embodiment of Figure 5 nor the embodiment of Figure 9 include a highly converging optical element adjacent to the light source, or any analogous structure.

Hence, there is no structure shown to collect nearly all of the light from an LED in Maekawa et al. To paraphrase Crown Operations above, '[i]f the [relevant] limitation is inherently disclosed by the [cited reference], it must be necessarily present and a person of ordinary skill in the art would recognize its presence.' Further, '[i]nherency "may not be established by probabilities or possibilities. . . ." ' Therefore, the fact that Maekawa et al does not show, teach, or suggest structure to collect nearly all of the light from an LED renders the 35 U.S.C. § 102 claim rejections improper.

Group 2 Argument:

Karsten Mfg. Corp. v. Cleveland Golf Co. 242 F.3d 1376; 58 U.S.P.Q.2D 1286 (2001) reiterated the standards for combining references in order to reject claims as obvious under 35 U.S.C. § 103:

> In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention. See ,e.g., Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc. , 21 F.3d 1068, 1072, 30 USPQ2d 1377, 1379 (Fed. Cir. 1994) (When the patent invention is made by combining known components to achieve a new system, the prior art must provide a suggestion, or motivation to make such a combination."); Northern Telecom v. Datapoint Corp. , 908 F.2d 931, 934, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990) (It is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor."); Uniroyal, Inc. v. Rudkin-Wiley Corp. , 837 F.2d 1044, 1044, 1051, 5 USPQ 1434, 1438 (Fed. Cir. 1988) (same). (Emphasis added)

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None of the references cited by the Examiner show, teach, or suggest structure for collecting nearly all of the light from an LED separately or in combination. Nor is there any motivation to make this improvement, as none of the references consider using an LED as the illumination source in a flow cytometer. Maekawa et al uses an LED (ref. no. 16) as a monitoring light in a triggering device for the actual illumination source, or "excitation" source, a

pulse laser (ref. no. 3). This embodiment is found in Figure 5 of Maekawa et al and described in column 10, lines 11-17. Figure 9 illustrates using a CW light source (ref. no. 29) which might be an LED, as a "monitoring light" to trigger "exciting" light source 3. See Figure 9 and column 13, lines 23-26.

Since CW light elements 16 and 29 are only used as monitoring lights to trigger the exciting lights comprising pulse lasers, conventional focussing of their light is sufficient for their purpose. Only when an LED <u>becomes</u> the exciting light source does it become necessary to collect nearly all of the light from the LED in order to focus it within the flow in the flow cytometer.

Applicant is the first inventor to use an LED as the illuminating source in a flow cytometer. Such a use requires that nearly all of the light be collected from the LED and concentrated at a selected volume in the flow, since LEDs are not particularly bright light sources, and are highly divergent and uncollimated. See Appendix B (found in the record in Office Communication of August 27, 2003) for a photograph of a conventional LED, showing the dissipation of the light. Each independent claim therefore includes the limitation that nearly all of the light be collected from the LED and concentrated at a selected volume in the flow.

Hence, the present application is neither anticipated nor rendered obvious by references which neither collect nearly all of the light from the LED and concentrate it at a selected volume in the flow, nor contemplate using an LED as the illuminating source, so that there would be no <u>reason</u> to collect and concentrate the light in this way.

Accordingly, the reversal of the Examiner by the honorable Board of Appeals is respectfully solicited.

Respectfully submitted,

MACHELEDT BALES LLP

Attorneys for Appellant

By Jennifer Bales

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Appendix A

The claims on appeal are as follows:

1. An LED illumination source device for use in a flow particle detection device comprising:

an LED for providing light at a selected wavelength; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

2. The device of claim 1, wherein the optical element comprises:

a collecting element having a small focal length for collecting the light from the LED and substantially collimating it to a roughly parallel beam of light; and

a focussing element for focussing the collimated beam.

3. The device of claim 1 wherein the collecting element is a ball lens.

4. The device of claim 1 wherein the LED is a composite LED which generates light at two wavelengths.

5. The device of claim 1 wherein the LED is a side emitting, flat pack, lensless LED.

6. The device of claim 1 wherein the flow particle detection device is a flow cytometer.

7. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

an illumination device for illuminating the sample stream within the flow zone; and

a detector assembly for detecting light emitted or scattered from illuminated target particles within the flow zone;

wherein the illumination device includes an LED illumination source device including -

an LED for providing light at a selected wavelength; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

8. The apparatus of claim 7 wherein the optical element comprises:

a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a parallel beam of light; and

a focussing element for focussing the collimated beam.

9. The apparatus of claim 8 wherein the collecting element is a ball lens.

10. The apparatus of claim 7 wherein the LED is a composite LED which generates light at two wavelengths.

11. The apparatus of claim 10 wherein the detector detects light emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone.

12. The apparatus of claim 11, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

13. The apparatus of claim 7 wherein the particle detection apparatus is a flow cytometer.

14. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

an illumination device for illuminating the sample stream within the flow zone with two selected wavelengths; and

a detector assembly for detecting light emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone;

wherein the illumination device includes an LED illumination source device including -

an LED for providing light at the two selected wavelengths; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

15. The apparatus of claim 14, wherein the detector assembly comprises two detectors for detecting emitted light at two wavelengths.

16. The apparatus of claim 14, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

17. The apparatus of claim 16, wherein the detector assembly comprises two detectors for detecting emitted light at the two wavelengths.

18. The apparatus of claim 14 wherein the optical element comprises:

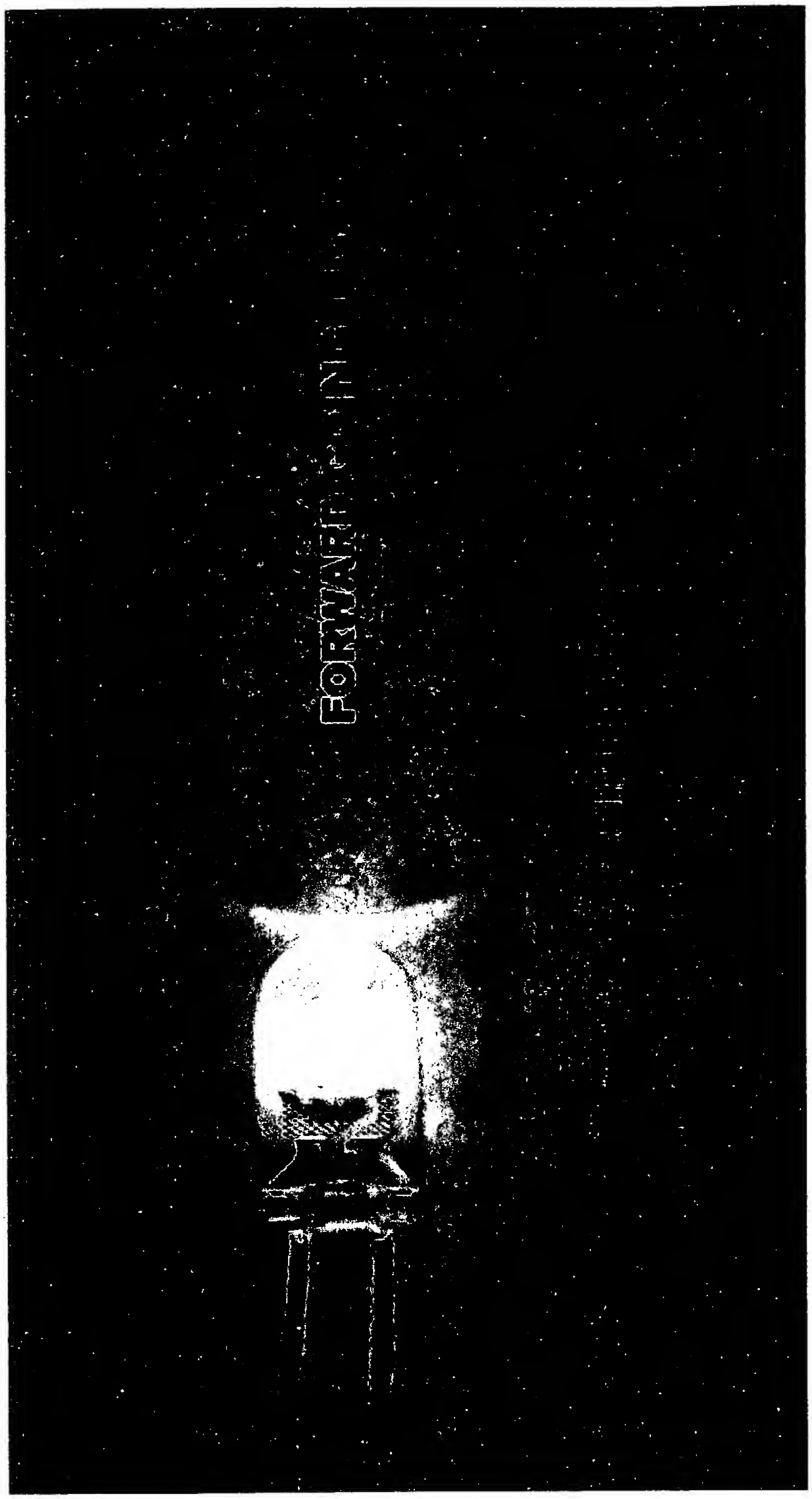
a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a roughly parallel beam of light; and

a focussing element for focussing the collimated beam.

19. The apparatus of claim 18 wherein the collecting element is a ball lens.

20. The apparatus of claim 14 wherein the particle detection apparatus is a flow cytometer.

Appendix B



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Serial No.:	09/804,522	)	Board of Appeals
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Group 2 Argument:

Karsten Mfg. Corp. v. Cleveland Golf Co. 242 F.3d 1376; 58 U.S.P.Q.2D 1286 (2001) reiterated the standards for combining references in order to reject claims as obvious under 35 U.S.C. § 103:

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None of the references cited by the Examiner show, teach, or suggest structure for collecting nearly all of the light from an LED separately or in combination. Nor is there any motivation to make this improvement, as none of the references consider using an LED as the illumination source in a flow cytometer. Maekawa et al uses an LED (ref. no. 16) as a monitoring light in a triggering device for the actual illumination source, or "excitation" source, a

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Applicant is the first inventor to use an LED as the illuminating source in a flow cytometer. Such a use requires that nearly all of the light be collected from the LED and concentrated at a selected volume in the flow, since LEDs are not particularly bright light sources, and are highly divergent and uncollimated. See Appendix B (found in the record in Office Communication of August 27, 2003) for a photograph of a conventional LED, showing the dissipation of the light. Each independent claim therefore includes the limitation that nearly all of the light be collected from the LED and concentrated at a selected volume in the flow.

Hence, the present application is neither anticipated nor rendered obvious by references which neither collect nearly all of the light from the LED and concentrate it at a selected volume in the flow, nor contemplate using an LED as the illuminating source, so that there would be no reason to collect and concentrate the light in this way.

Accordingly, the reversal of the Examiner by the honorable Board of Appeals is respectfully solicited.

Respectfully submitted,

MACHELEDT BALES LLP

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Appendix A

The claims on appeal are as follows:

1. An LED illumination source device for use in a flow particle detection device comprising:

an LED for providing light at a selected wavelength; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

2. The device of claim 1, wherein the optical element comprises:

a collecting element having a small focal length for collecting the light from the LED and substantially collimating it to a roughly parallel beam of light; and

a focussing element for focussing the collimated beam.

3. The device of claim 1 wherein the collecting element is a ball lens.

4. The device of claim 1 wherein the LED is a composite LED which generates light at two wavelengths.

5. The device of claim 1 wherein the LED is a side emitting, flat pack, lensless LED.

6. The device of claim 1 wherein the flow particle detection device is a flow cytometer.

7. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

an illumination device for illuminating the sample stream within the flow zone; and

a detector assembly for detecting light emitted or scattered from illuminated target particles within the flow zone;

wherein the illumination device includes an LED illumination source device including -

an LED for providing light at a selected wavelength; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

8. The apparatus of claim 7 wherein the optical element comprises:

a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a parallel beam of light; and

a focussing element for focussing the collimated beam.

9. The apparatus of claim 8 wherein the collecting element is a ball lens.

10. The apparatus of claim 7 wherein the LED is a composite LED which generates light at two wavelengths.

11. The apparatus of claim 10 wherein the detector detects light emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone.

12. The apparatus of claim 11, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

13. The apparatus of claim 7 wherein the particle detection apparatus is a flow cytometer.

14. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

an illumination device for illuminating the sample stream within the flow zone with two selected wavelengths; and

a detector assembly for detecting light emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone;

wherein the illumination device includes an LED illumination source device including -

an LED for providing light at the two selected wavelengths; and

an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

15. The apparatus of claim 14, wherein the detector assembly comprises two detectors for detecting emitted light at two wavelengths.

16. The apparatus of claim 14, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

17. The apparatus of claim 16, wherein the detector assembly comprises two detectors for detecting emitted light at the two wavelengths.

18. The apparatus of claim 14 wherein the optical element comprises:

a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a roughly parallel beam of light; and

a focussing element for focussing the collimated beam.

19. The apparatus of claim 18 wherein the collecting element is a ball lens.

20. The apparatus of claim 14 wherein the particle detection apparatus is a flow cytometer.

Appendix B